# Integration of Chemical and Electrochemical Devices with Silicon Microelectronics Enabling Microsensors and Reactors.

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The development of microsensors and other microanalytical devices has the potential to expand our understanding and control of environmental conditions. Integrated, mass-formed micro-arrays are particularly important because of the signal fidelity they offer and the ability to fabricate them using microelectronic or other low-cost processes. The advantages of such microanalytical systems include lower labor requirements, low reagent usage and costs, and shorter times for synthesis, sensing, and analysis. One can imagine synthesizing and analyzing thousands of compounds simultaneously using a single, highly integrated micro device, or performing a complete chemical assay using a smart-chip.

In this work, the integration of microchemical and microelectrochemical devices with silicon integrated circuit technology (IC) is being investigated. The IC infrastructure brings opportunities for mass fabrication of thin-films and integration of electronic functions (e.g. low noise amplifiers, and custom logic functions) with chemical or electrochemical functions. However, the silicon processing also imposes design, materials, and cost restrictions.

Methods for integrating microsensor, microreactor, and micropower sources on ICs will be presented. The demonstrations include microsensors, reactors, and power sources. The limits and boundary conditions to the integration of devices will also be explored.